

APPENDIX A. SEARCH STRATEGIES

PubMed: July 27, 2018

#1	"Triage"[Mesh] OR triage[tiab] OR triages[tiab] OR triaged[tiab] OR triaging[tiab] OR teletriage[tiab] OR "Referral and Consultation"[Mesh:NoExp] OR "Remote Consultation"[Mesh] OR consultation[ti] OR consultation[ot] OR consultations[ti] OR consultations[ot] OR teleconsultation[tiab] OR teleconsultations[tiab] OR telenursing[tiab] OR telenurse[tiab] OR telenurses[tiab] OR "After-Hours Care"[Mesh] OR "out-of-hours"[tiab] OR "after-hours"[tiab] OR "unscheduled care"[tiab]	95,358
#2	"Telephone"[Mesh:NoExp] OR telephone[tiab] OR "Hotlines"[Mesh] OR hotline[tiab] OR hotlines[tiab] OR "hot line"[tiab] OR "hot lines"[tiab] OR helpline[tiab] OR helplines[tiab] OR "help line"[tiab] OR "help lines"[tiab] OR "Call Centers"[Mesh] OR "call center"[tiab] OR "call centers"[tiab] OR "call centre"[tiab] OR "call centres"[tiab] OR "communication technologies"[tiab] OR "communication technology"[tiab] OR telehealth[tiab] OR eHealth[tiab] OR mhealth[tiab] OR ("face-to-face"[tiab] AND (alternative[tiab] OR alternatives[tiab])) OR ("communication"[tiab] AND (alternative[tiab] OR alternatives[tiab])) OR ("in-person"[tiab] AND (alternative[tiab] OR alternatives[tiab])) OR virtual[ti] OR ("After-Hours Care"[Mesh]) AND "Primary Health Care"[Mesh] OR ("after hours"[ti] OR "out of hours"[ti]) AND ("primary medical care"[ti] OR "primary care"[ti] OR "general medicine"[ti]))	91,636
#3	#1 AND #2	5,274
#4	#3 AND English[lang]	4,970
#5	#4 AND ("1990/01/01"[Date - Publication] : "3000"[Date - Publication])	4,711
#6	#5 NOT (animals[mh] NOT humans[mh])	4,707
#7	#6 NOT ("Adolescent"[Mesh] OR "Child"[Mesh] OR "Infant"[Mesh]) NOT "Adult"[Mesh])	4,311
#8 (KQ1)	#7 AND (("randomized controlled trial"[ptyp] OR "controlled clinical trial"[ptyp] OR randomized[tiab] OR randomised[tiab] OR randomization[tiab] OR randomisation[tiab] OR placebo[tiab] OR randomly[tiab] OR trial[tiab] OR groups[tiab] OR "Comparative Study"[ptyp] OR "clinical trial"[pt] OR "clinical trial"[tiab] OR "clinical trials"[tiab] OR "evaluation studies"[ptyp] OR "evaluation studies as topic"[MeSH] OR "evaluation study"[tiab] OR "evaluation studies"[tiab] OR drug therapy[sh] OR "intervention study"[tiab] OR "intervention studies"[tiab] OR "cohort studies"[MeSH] OR cohort[tiab] OR "longitudinal studies"[MeSH] OR longitudinal[tiab] OR longitudinally[tiab] OR prospective[tiab] OR prospectively[tiab] OR "follow up"[tiab] OR "comparative study"[pt] OR "comparative studies"[tiab] OR nonrandom[tiab] OR "non-random"[tiab] OR nonrandomized[tiab] OR "non-randomized"[tiab] OR nonrandomised[tiab] OR "non-randomised"[tiab] OR quasi-experiment*[tiab] OR quasiexperiment*[tiab] OR quasirandom*[tiab] OR quasi-random*[tiab] OR quasi-control*[tiab] OR quasicontrol*[tiab] OR (controlled[tiab] AND (trial[tiab] OR study[tiab])) OR "pre-post"[tiab] OR "posttest"[tiab] OR "post-test"[tiab] OR pretest[tiab] OR pre-test[tiab] OR (before[tiab] AND after[tiab]) OR (before[tiab] AND during[tiab]) NOT (Editorial[ptyp] OR Letter[ptyp] OR Comment[ptyp]))	2,289
#9 (KQ2)	#7 NOT (Editorial[ptyp] OR Letter[ptyp] OR Comment[ptyp])	4,108

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#1	triage:ti,ab OR triages:ti,ab OR triaged:ti,ab OR triaging:ti,ab OR teletriage:ti,ab OR consultation:ti OR consultation:kw OR consultations:ti OR consultations:kw OR 'teleconsultation'/exp OR teleconsultation:ti,ab OR teleconsultations:ti,ab OR telenursing:ti,ab OR telenurse:ti,ab OR telenurses:ti,ab OR 'out-of-hours care'/exp OR 'out-of-hours':ti,ab OR 'after-hours':ti,ab OR 'unscheduled care':ti,ab	56,847
#2	'telephone'/exp OR telephone:ti,ab OR 'hotline'/exp OR hotline:ti,ab OR hotlines:ti,ab OR 'hot line':ti,ab OR 'hot lines':ti,ab OR helpline:ti,ab OR helplines:ti,ab OR 'help line':ti,ab OR 'help lines':ti,ab OR 'call center'/exp OR 'call center':ti,ab OR 'call centres':ti,ab OR 'call centre':ti,ab OR 'call centres':ti,ab OR 'communication technologies':ti,ab OR 'communication technology':ti,ab OR telehealth:ti,ab OR ehealth:ti,ab OR mhealth:ti,ab OR (((('face-to-face' OR 'communication' OR 'in-person' OR 'inperson') NEAR/4 (alternative OR alternatives)):ti,ab) OR (((('after hours' OR 'out of hours') NEAR/3 ('primary' OR 'general')):ti,ab)	92,056
#3	#1 AND #2	6,891
#4	#3 AND [humans]/lim AND [english]/lim AND [1990-2018]/py	5,961

#5	#4 NOT (([embryo]/lim OR [fetus]/lim OR [newborn]/lim OR [infant]/lim OR [child]/lim OR [preschool]/lim OR [school]/lim) NOT ([young adult]/lim OR [adult]/lim OR [middle aged]/lim OR [aged]/lim OR [very elderly]/lim))	5,442
#6 (KQ1)	#5 AND ('randomized controlled trial'/exp OR 'crossover procedure'/exp OR 'double blind procedure'/exp OR 'single blind procedure'/exp OR random*:ti,ab OR factorial*:ti,ab OR crossover*:ti,ab OR ((cross NEAR/1 over*):ti,ab) OR placebo*:ti,ab OR ((doubl* NEAR/1 blind*):ti,ab) OR ((singl* NEAR/1 blind*):ti,ab) OR assign*:ti,ab OR allocat*:ti,ab OR volunteer*:ti,ab OR 'clinical study'/exp OR 'clinical trial':ti,ab OR 'clinical trials':ti,ab OR 'controlled study'/exp OR 'evaluation'/exp OR 'evaluation study':ti,ab OR 'evaluation studies':ti,ab OR 'intervention study':ti,ab OR 'intervention studies':ti,ab OR 'case control':ti,ab OR 'cohort analysis'/exp OR cohort:ti,ab OR longitudinal*:ti,ab OR prospective:ti,ab OR prospectively:ti,ab OR retrospective:ti,ab OR 'follow up'/exp OR 'follow up':ti,ab OR 'comparative effectiveness'/exp OR 'comparative study'/exp OR 'comparative study':ti,ab OR 'comparative studies':ti,ab OR 'evidence based medicine'/exp) NOT ('case report'/exp OR 'a case report':ti OR ': case report':ti OR 'case study'/exp OR 'editorial'/exp OR 'letter'/exp OR 'note'/exp OR [editorial]/lim OR [letter]/lim OR [note]/lim OR [conference abstract]/lim)	2,662
#7 (KQ2)	#5 NOT ('editorial'/exp OR 'letter'/exp OR 'note'/exp OR [editorial]/lim OR [letter]/lim OR [note]/lim OR [conference abstract]/lim)	3,750

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S1	(MH "Triage") OR (MH "Remote Consultation") OR TI (triage OR triages OR triaged OR triaging OR teletriage OR consultation OR consultations OR teleconsultation OR teleconsultations OR telenursing OR telenurse OR telenurses OR "out-of-hours" OR "after-hours" OR "unscheduled care") OR AB (triage OR triages OR triaged OR triaging OR teletriage OR consultation OR consultations OR teleconsultation OR teleconsultations OR telenursing OR telenurse OR telenurses OR "out-of-hours" OR "after-hours" OR "unscheduled care")	40,009
S2	(MH "Telehealth+") OR (MH "Remote Access to Information") OR TI (telephone OR telephones OR hotline OR hotlines OR "hot line" OR "hot lines" OR helpline OR helplines OR "help line" OR "help lines" OR "call center" OR "call centers" OR "communication technologies" OR "communication technology" OR telehealth OR eHealth OR mhealth) OR AB (telephone OR telephones OR hotline OR hotlines OR "hot line" OR "hot lines" OR helpline OR helplines OR "help line" OR "help lines" OR "call center" OR "call centers" OR "communication technologies" OR "communication technology" OR telehealth OR eHealth OR mhealth)	44,713
S3	S1 AND S2 <i>Limiters - English Language; Peer Reviewed; Published Date: 19900101-20180731; Exclude MEDLINE records</i>	961

APPENDIX B. INTERVENTION CHARACTERISTICS TABLES

For full study citations in this appendix, please refer to the report's main reference list.

KQ 1 STUDIES

Study # Enrolled	Comparison Type Description of Triage System	Type/Number of Professionals ^a Dedicated Staff for Triage? ^b Access to Medical Records?	Co-located Staff? Special Training?	Decision Support Protocol ^c Scope of Practice Described? ^d Handoff to PCP? ^e	Mode of Delivery Hours of Operation Caller Identified? ^f
<i>RCTs (Individual and Cluster)</i>					
Campbell, 2014 ³⁸ N=20990 patients	Comparison: Mode; professional type Primary care practices across 4 centers in the UK. Callers in either intervention arm who had requested a same-day appointment would receive a call back and triage by a GP triage or a nurse with software support.	MD: Varies per arm RN: Varies per arm Admin/reception: Varies per arm Dedicated staff: Yes Access: Yes	Co-location: NR Special training: 4-5 weeks, included commercial providers who trained staff and organization in triage practice and software; appointment request audit provided guidance in organizing the triage system; GP triage skills; and professional issues and telephone consult.	Decision support: Odyssey Patient Assess Software, Stour access system Scope of practice described: Yes Handoff to PCP: NR	Telephone contact Regular clinic daytime hours Caller ID: No
Cragg, 1997 ⁴⁴ N=2,152 patients	Comparison: Local vs regional/national Practices were randomized to have their own physicians cover out-of-hours calls vs a regional deputizing physician service within four communities.	MD: 49 practice GPs and 183 Deputizing Dedicated staff: Yes, in practice arm Access: NR	Co-location: NR Special training NR	Decision support: NR Scope of practice described: No Handoff to PCP: NR	Telephone contact After hours Caller ID: No

Study # Enrolled	Comparison Type Description of Triage System	Type/Number of Professionals^a Dedicated Staff for Triage?^b Access to Medical Records?	Co-located Staff? Special Training?	Decision Support Protocol^c Scope of Practice Described?^d Handoff to PCP?^e	Mode of Delivery Hours of Operation Caller Identified?^f
Lattimer, 1998 ⁴³ N=14,492 calls	Comparison: Professional type Nurse telephone triage offered to out-of-hours callers compared to a local GP out-of-hours cooperative.	Nurse (unspecified credentials): 6 Admin/reception: NR Dedicated staff: NR Access: NR	Co-location: Yes Special training: 6-week training program prior to start of intervention	Decision support: Telephone advice system, interactive Scope of practice described: no Handoff to PCP: Yes	Telephone contact After hours Caller ID: No
McKinstry, 2002 ⁴² N=388 patients	Comparison: Mode Telephone advice dispensed by a general practitioner that was initiated by a patient from a practice requesting a same-day appointment. Comparison group was in-person visit.	MD: NR Dedicated staff: Yes Access: Yes	Co-location: Yes Special training: NR	Decision support: NR Scope of practice described: No Handoff to PCP: No	Telephone contact Regular hours Caller ID: No
Richards, 2004 ⁴⁰ N=4,718 patients	Comparison: Local vs regional/national The intervention was NHS Direct compared to in-practice nurse triage. NHS Direct is a regional nurse-led telephone triage system supported by computerized algorithms. Nurses telephoned the patient back after request for same-day appointment.	Nurse (unspecified credentials): NR Dedicated staff: No Access: No	Co-location: No Special training: NR	Decision support: NHS Direct Scope of practice described: no Handoff to PCP: No	Telephone contact Regular hours Caller ID: No

Study # Enrolled	Comparison Type Description of Triage System	Type/Number of Professionals ^a Dedicated Staff for Triage? ^b Access to Medical Records?	Co-located Staff? Special Training?	Decision Support Protocol ^c Scope of Practice Described? ^d Handoff to PCP? ^e	Mode of Delivery Hours of Operation Caller Identified? ^f
<i>Controlled Before-After</i>					
Knowles, 2016 ³⁷ N=2,237 patients	Comparison: professional type The study compared a new telephone triage service (NHS 111) with the existing telephone triage service (NHS Direct). NHS 111 is staffed by non-clinician call-handlers who use computerized triage software with clinician back-up to direct callers to the appropriate service or self-management advice; NHS Direct is staffed by nurses.	Nonclinical call handlers: NR Dedicated staff: No Access: NR	Co-located: Yes Special training: Varied by site but generally NHS pathways training, transfer processes, communication skills, record keeping	Decision support: NHS Pathways software Scope of practice: No Handoff to PCP: No	Telephone contact Regular and after hours Caller ID: No
Munro, 2000 ⁴⁵ N= 68,500	Comparison: Local vs regional/national NHS Direct Nurse-led telephone triage compared to local GP cooperatives.	Nurse (unspecified credentials): NR Dedicated staff: No Access: No	Co-location: Yes Special training: NHS nurses were "trained to triage."	Decision support: NHS Clinical Assessment System Scope of practice: Yes Handoff to PCP: Yes	Telephone contact Regular and after hours Caller ID: Yes
Turner, 2013 ³⁹ N=1,802,000 calls	Comparison: Professional type Study compared NHS 111, a 24-hour telephone triage system staffed by non-clinician call-handlers, to NHS Direct which employs nurse triage professionals.	Nurse (unspecified credentials): NR Nonclinical call handler: NR Dedicated staff: No Access: No	Co-location: Yes Special training: NR	Decision support: NHS Pathways software Scope of practice described: Yes Handoff to PCP: No	Telephone contact Regular and after hours Caller ID: No

Study # Enrolled	Comparison Type Description of Triage System	Type/Number of Professionals ^a Dedicated Staff for Triage? ^b Access to Medical Records?	Co-located Staff? Special Training?	Decision Support Protocol ^c Scope of Practice Described? ^d Handoff to PCP? ^e	Mode of Delivery Hours of Operation Caller Identified? ^f
<i>Interrupted Time Series</i>					
Richards, 2002 ⁴¹ N=4,685 patients	Comparison: Local vs regional/national This study randomized callers to either a small nurse triage of 6 nurses or a same-day primary care visit. Receptionists in control group were told "not to attempt any triage".	Nurse (unspecified credentials): 6 Dedicated staff: No Access: NR	Co-location: NR Special training: 30 hours of minor illness management training	Decision support: protocol internally developed Scope of practice described: no Handoff to PCP: Yes	Telephone contact Regular hours Caller ID: No

^a Type of professional involved in delivering the triage system.

^b Dedicated triage staff are professionals whose primary job responsibility is to triage patients. This differs from staff who may have triage responsibilities in addition to their primary role.

^c Decision support protocol is any tool or algorithm used to support clinical decision making or provide guidance for triage decisions.

^d Scope of practice is any specific guidance about a particular staff member's role and potential limits to their clinical discretion.

^e Handoff to primary care practitioner refers to the ability for triage staff to communicate with a patient's primary care team synchronously or asynchronously.

^f Caller identification refers to the capacity to verify the identify the caller.

Abbreviations: CAS=computerized clinical assessment system; CDSS=clinical decision support system/software; CeCC=CareEnhance Call Centre software; GP=general practitioner; MD=medical doctor; NHS=National Health Service; PCP=primary care provider; RN=registered nurse

KQ 2 STUDIES

Study # Enrolled	Description of Triage System	Type/Number of Professionals ^a Dedicated Triage Staff? ^b	Co-located Staff? Special Training?	Decision Support Protocol ^c Scope of Practice Described? ^d Handoff to PCP? ^e	Mode of Delivery Hours of Operation Caller Identified? ^f
<i>Qualitative studies</i>					
Banks, 2018 ⁸¹ N=23	Interviews with practice staff about eConsult, an online platform, which gives patients access to advice via their GP practice website. Patients can use a symptom checker, find pharmacy advice, link to the NHS 111 service, and use an administrative service to submit an e-consultation.	MD: 10 Nurse practitioner: 1 admin/reception: 6 Practice manager: 6 Dedicated staff: No	Co-location: NR Special training: NR	Decision support: eConsult; online; interactive Scope of practice described: No Handoff to PCP: Yes	Internet contact Hours of operation: NR Caller ID: No
Derkx, 2007 ⁸⁰ N=8	Study assessed communication skills of clinical nurse call-handlers in an out-of-hours call center in the Netherlands.	Nurse (unspecified credentials): NR Other staff: NR Dedicated staff: Yes	Co-location: NR Special training: NR	Decision support: NR Scope of practice described: No Handoff to PCP: NR	Telephone contact After hours Caller ID: No
Eccles, 2015 ⁶² N=55	A health care system in Wales changed their out-of-hours staffing system from call-handlers using protocols to a system that used call-handlers to obtain information and GPs who called patients back. Interviews with GPs and patients about perceptions.	MD: at least 40 Call Handlers: NR Dedicated staff: Yes	Co-location: Yes Training workshops were provided to improve triage productivity, communication skills and appropriate use of triage outcomes and telephone advice.	Decision support: protocol internally developed Scope of practice described: Yes Handoff to PCP: NR	Telephone contact After hours Caller ID: No
Edwards, 1996 ⁶⁷ N=8	Qualitative interviews with nurses from community hospitals with walk-in minor injury service that also handled phone inquiries.	Nurse (unspecified credentials): NR Dedicated staff: Yes	Co-location: No Special training: NR	Decision support: NR Scope of practice described: No Handoff to PCP: NR	Telephone contact Hours of operation: NR Caller ID: No

Study # Enrolled	Description of Triage System	Type/Number of Professionals ^a Dedicated Triage Staff? ^b	Co-located Staff? Special Training?	Decision Support Protocol ^c Scope of Practice Described? ^d Handoff to PCP? ^e	Mode of Delivery Hours of Operation Caller Identified? ^f
Foster, 1999 ⁶³ N=38	Out-of-hours cooperative in South London where they handle 62% of calls by telephone alone. This particular paper documents interviews with GPs before they attended a course on how to provide advice over the phone.	MD : 38 Dedicated staff: Yes	Co-location: NR Special training: NR	Decision support: NR Scope of practice described: No Handoff to PCP: NR	Telephone contact After hours Caller ID: No
Gamst-Jensen, 2017 ⁶⁸ N=19	Out-of-hours phone hotline for region in Denmark answered by nurse or MD. Interviews conducted with staff about under-triaged calls.	MD: NR Nurse (unspecified credentials): NR Dedicated staff: NR	Co-location: NR Special training: NR	Decision support: internally developed; online; expertise based Scope of practice described: No Handoff to PCP: NR	Telephone contact After hours Caller ID: No
Greatbatch, 2005 ⁸² N= 60	Qualitative study of the use of the CAS system, which mediates interactions between callers to the NHS Direct and nurses. Nurses address calls based on priority set by call-handlers. CAS then recommends a disposition. Nurse can recommend alternate dispositions if rationale are documented.	Nurse (unspecified credentials): NR Call handlers: NR Dedicated staff: Yes	Co-location: NR Special training: NR	Decision support: NHS Direct CAS system Scope of practice described: No Handoff to PCP: NR	Telephone contact Regular hours and after hours Caller ID: No
Holmström, 2007 ⁷⁶ N=12	Telephone nursing in Sweden in the early 2000s was de-centralized and not operational for 24/hrs a day. This study interviewed nurses at 1 specific call center about ethical dilemmas.	Registered Nurse: NR Dedicated staff: Yes	Co-location: Yes Special training: NR	Decision support: NR Scope of practice described: No Handoff to PCP: NR	Telephone contact Regular hours Caller ID: Yes
Holmström, 2016 ⁷⁵ N=10	The national phone service in Sweden is available 24/7 but patients are instructed to call their primary health care center during regular business hours. This study	Nurse (unspecified credentials): NR Dedicated staff: NR	Co-location: NR Special training: NR	Decision support: NR Scope of practice described: No	Telephone contact Regular hours Caller ID: No

Study # Enrolled	Description of Triage System	Type/Number of Professionals ^a Dedicated Triage Staff? ^b	Co-located Staff? Special Training?	Decision Support Protocol ^c Scope of Practice Described? ^d Handoff to PCP? ^e	Mode of Delivery Hours of Operation Caller Identified? ^f
	looked at how elder adults perceived their experiences with local primary care nurse advice/triage lines.			Handoff to PCP: NR	
Lopriore, 2017 ⁸³ N= 196 calls	Qualitative analysis of health care triage telephone calls into HealthDirect Australia to explore health care managed over the phone. Calls were placed by patients and received by nurses using CDSS.	Registered Nurse: NR Dedicated staff: No	Co-location: NR Special training: NR	Decision support: computer decision support software; HealthCare Direct policy Scope of practice described: Yes Handoff to PCP: NR	Telephone contact Hours of operation: NR Caller ID: Yes
O'Cathain, 2004 ⁷⁹ N=24	Description of nurse characteristics and perceptions that may lead to different triage resolution in the NHS Direct service. 24 nurses were interviewed.	Registered Nurse: 296 Dedicated staff: NR	Co-location: NR Special training: NR	Decision support: 3 different decision support softwares used by the interviewed nurses; Yes/No protocols; general guidance; and expertise based Scope of practice described: No Handoff to PCP: NR	Telephone contact Regular hours and after hours Caller ID: No
Pettinari, 2001 ⁶⁹ N=14	NHS Direct 24-hour nurse phone triage and helpline. Focus of study was to describe nurses' perceptions of skills they use to manage calls without visual cues.	Nurse (unspecified credentials): NR Dedicated staff: No	Co-location: NR 12 weeks of training	Decision support: NHS CDSS Scope of practice described: No Handoff to PCP: NR	Telephone contact Regular hours and after hours Caller ID: No

Study # Enrolled	Description of Triage System	Type/Number of Professionals ^a Dedicated Triage Staff? ^b	Co-located Staff? Special Training?	Decision Support Protocol ^c Scope of Practice Described? ^d Handoff to PCP? ^e	Mode of Delivery Hours of Operation Caller Identified? ^f
Pope, 2013 ⁷² N=64	Ethnographic study of computer support systems using the Normalization Process Theory. Investigators observed for 500 hours at multiple triage sites (emergency line, urgent care line, out-of-hours line).	Call handlers: 10-12 hour shifts Supervisors: NR Clinical support staff: NR Dedicated staff: NR	Co-location: Yes Emergency phone line staff received 12 days training on computer system	Decision support: Clinical Decision Support (CDS); interactive Scope of practice described: Yes Handoff to PCP: NR	Telephone contact Regular and after hours Caller ID: No
Purc-Stephenson, 2010 ⁶⁴ N=16 studies	Meta-ethnography. Reviewed qualitative studies of telephone triage nurses, with aim to explore nurses' experiences with telephone triage and advice within the primary-care sector and to understand the factors that facilitate or impede their decision making process.	Nurse (unspecified credentials): NR Dedicated staff: NR	Co-location: NR Special training: NR	Decision support: NR Scope of practice described: No Handoff to PCP: NR	Telephone contact Hours of operation: NR Caller ID: No
Richards, 2007 ⁷⁴ N=27	Three out-of-hours primary care services from different regions in England. The call is taken by a nonclinical call handler who uses a protocol to call an ambulance or provide health professional call-back. Interviews were done to explore caller experience.	MD: NR NP: NR Call handler: NR Paramedic: NR Dedicated staff: NR	Co-location: NR Special training: NR	Decision support: standardized protocol Scope of practice described: No Handoff to PCP: Yes	Telephone contact After hours Caller ID: No
Roberts, 2009 ⁷⁷ N=35	This study was conducted in NHS 24 (Scotland). It is "integrated as a central part of the NHS". It is the first and only point of contact for after-hours GPs. The study's focus was to describe stakeholder and partner views on remote and rural communities.	Nurse (unspecified credentials): NR Dedicated staff: No	Co-location: NR Special training: NR	Decision support: NR Scope of practice described: No Handoff to PCP: NR	Telephone contact Regular hours and after hours Caller ID: No
Roing, 2015 ⁶⁵ N=11	Qualitative interviews with 6 telenurses and 5 call center managers who had been involved	Registered Nurse: 6 Call managers: 5	Co-location: Yes Special training: NR	Decision support: Decision Support Tool (DST), online	Telephone contact

Study # Enrolled	Description of Triage System	Type/Number of Professionals ^a Dedicated Triage Staff? ^b	Co-located Staff? Special Training?	Decision Support Protocol ^c Scope of Practice Described? ^d Handoff to PCP? ^e	Mode of Delivery Hours of Operation Caller Identified? ^f
	in malpractice claims within the Swedish Healthcare Direct, the national telenursing helpline.	Dedicated staff: NR		Scope of practice described: No Handoff to PCP: NR	Regular hours and after hours Caller ID: No
Tariq, 2017 ⁷³ N=9	Qualitative interviews with nurses about the usability of the decision support system (CeCC), which provides clinical guidelines for triage nurses.	Nurse (unspecified credentials): 9 Dedicated staff: NR	Co-location: NR Special training: NR	Decision support: CeCC, online, interactive Scope of practice described: No Handoff to PCP: NR	Telephone contact Regular hours and after hours Caller ID: No
Timpka, 1990 ⁷⁰ N=5	Health center receptionist-nurse in a town with 30,000 people in Sweden. Qualitative analysis completed on the content of the calls between receptionist nurse & patient to describe decision-making process and communication.	Nurse (unspecified credentials): 5 Dedicated staff: No	Co-location: Yes Special training: No	Decision support: NR Scope of practice described: No Handoff to PCP: NR	Telephone contact Hours of operation: NR Caller ID: No
Turnbull, 2012 ⁷⁸ N=61	Interviews to examine skills required by nonclinical call-handlers for telephone triage supported by CDSS. Call-handlers involved in triage at 999 emergency line, urgent care line, out-of-hours line.	Type of staff NR Dedicated staff: NR	Co-location: Yes Special training: NR	Decision support: CDSS; interactive; general guidance Scope of practice described: No Handoff to PCP: NR	Telephone contact Hours of operation: NR Caller ID: No
Turnbull, 2014 & 2017 ⁷¹ N=47	111 phone services for urgent calls that are 'not emergent' that are available to NHS patients 24 hrs a day. Ethnography aimed to describe work, workforce, technology, and organizational implications.	MD: NR Registered Nurse : NR Call advisers: 70, 30, 31, 113, 54 FT & PT depending on cite. Other: NR Dedicated staff: Varied by site	Co-location: Yes Special training: 2- week training program in addition to 2 more weeks of training at the site as well as call observation and coaching.	Decision support: NHS Pathways, documented, online, interactive, Yes/No protocol Scope of practice described: Yes Handoff to PCP: Yes	Telephone contact Regular hours and after hours Caller ID: No

Study # Enrolled	Description of Triage System	Type/Number of Professionals ^a Dedicated Triage Staff? ^b	Co-located Staff? Special Training?	Decision Support Protocol ^c Scope of Practice Described? ^d Handoff to PCP? ^e	Mode of Delivery Hours of Operation Caller Identified? ^f
Wahlberg, 2018 ⁶¹ N=24	The remote triage was completed by nurses using CDSS at Swedish Healthcare Direct. The calls were not prescreened by a call-handler. 24 interviews were completed between March and May 2015. The goal was to understand the work environment at the call center.	Nurse (unspecified credentials): 24 Dedicated staff: No	Co-location: No Special training: NR	Decision support: Clinical Decision Support Software (CDSS) Scope of practice described: No Handoff to PCP: NR	Telephone contact Hours of operation: NR Caller ID: No
<i>Systematic reviews</i>					
Blank, 2012 ⁶⁶ N=54 papers	This systematic review included studies about telephone triage. Twenty-six studies reported appropriateness of triage decisions and 26 papers reported on compliance with triage decision. Two studies reported both.	Varied by cite but included: MD: NR Nurse (unspecified credentials): NR Lay operator: NR Dedicated staff: NR	Co-location: NR Special training: NR	Decision support: NR Scope of practice described: No Handoff to PCP: NR	Telephone contact Regular hours and after hours Caller ID: No
Bunn, 2004 ²¹ N=9 studies	Systematic review assessed the effects of telephone triage on safety, service usage, and patient satisfaction and compared telephone triage by different health care professionals.	Type of staff NR Dedicated staff: NR	Co-location: NR Special training: NR	Decision support: NR Scope of practice described: No Handoff to PCP: NR	Telephone contact Hours of operation: NR Caller ID: No
Carrasqueiro, 2011 ³⁶ N=55 studies	This systematic review included studies on telephone triage to review evaluation studies and compile methodologies and metrics used as well as compare results.	Type of staff NR Dedicated staff: NR	Co-location: NR Special training: NR	Decision support: NR Scope of practice described: No Handoff to PCP: NR	Telephone contact Hours of operation: NR Caller ID: No
Lake, 2017 ²³ N=10 systematic reviews	Review of systematic reviews focused on telephone-based triage and advice services; published since 1990; not targeting specific condition, population, medical specialty, or chronic conditions;	MD: NR Nurse (unspecified credentials): NR Admin/reception: NR Health assistant: NR	Co-location: NR Special training: NR	Decision support: Varied by cite Scope of practice described: No	Telephone contact Regular hours and after hours Caller ID: No

Study # Enrolled	Description of Triage System	Type/Number of Professionals ^a Dedicated Triage Staff? ^b	Co-located Staff? Special Training?	Decision Support Protocol ^c Scope of Practice Described? ^d Handoff to PCP? ^e	Mode of Delivery Hours of Operation Caller Identified? ^f
	and not related to general health education.	Dedicated staff: other		Handoff to PCP: NR	

^a Type of professional involved in delivering the triage system.

^b Dedicated triage staff are professionals whose primary job responsibility is to triage patients. This differs from staff who may have triage responsibilities in addition to their primary role.

^c Decision support protocol is any tool or algorithm used to support clinical decision making or provide guidance for triage decisions.

^d Scope of practice is any specific guidance about a particular staff member's role and potential limits to their clinical discretion.

^e Handoff to primary care practitioner refers to the ability for triage staff to communicate with a patient's primary care team synchronously or asynchronously.

^f Caller identification refers to the capacity to verify the identify the caller.

Abbreviations: CAS=computerized clinical assessment system; CDSS=clinical decision support software/system; CeCC=CareEnhance Call Centre software; GP=general practitioner; NHS=National Health Service; NR=not reported; PCP=primary care provider

APPENDIX C. STUDY CHARACTERISTICS TABLES

KQ 1 STUDIES

Study Country # Enrolled # Arms Relevant KQ (Companion Papers)	Key Components (Staff, Mode, Protocol, Hours)	Eligibility	Mean Age (SD) % Female % Race Top 3 Health Issues Insurance Type	Reported Outcomes Timing Primary Outcome	Risk of Bias for Objective and Patient-Reported Outcomes
<i>RCT: Individual randomization</i>					
McKinstry, 2002 ⁴² Scotland N=388 patients 2 arms KQs 1, 3	MD Telephone Protocol NR Regular hours	Patients of 2 general medical practices calling to request a same-day appointment	Age: NR Female: NR Race: NR Top 3: NR Insurance type: National Health Service	Outcomes: - Patient satisfaction - Utilization: ED visit Primary care visit Timing: Study based on single point of telephone contact; use of service 2 weeks after randomization Primary outcome: Physician time spent on telephone advice vs face-to-face care	Objective: Low Patient reported: High
<i>RCT: Cluster randomization</i>					
Campbell, 2014 ³⁸ ESTEEM Trial UK N=20,990 patients 3 arms KQs 1, 2, 3 <i>Primary study for KQ 2: Campbell, 2015⁹² (Holt, 2016⁹³ Warren, 2015⁹⁴ Calitri, 2015⁹⁵ Murdoch, 2015⁹⁶ Varley, 2016⁹⁷ Holt, 2016⁹⁸</i>	(1) MD Telephone Protocol: Stour access system Hours NR (2) Nurse (NP, RN) Telephone Protocol: Plain Healthcare Odyssey Patient Access Hours NR	Practices in 1 of 4 UK “centers” linked to university medical school; recruitment run through a primary care research network without an existing remote triage system (defined as a telephone-based system to manage more than 75% of same-day requests)	<u>MD Triage:</u> Age: 43.08 (24.32) Female: 59.54% White: 56.03% Black: <1% Hispanic: NA Asian: 1.15% Other: <1% Top 3: NR Insurance type: NR <u>Nurse Triage:</u> Age: 41.5 (25.2) Female: 60% White: 51.0%	Outcomes: - Patient satisfaction - Patient safety Deaths Hospitalization ED visit - Total cost - Utilization: ED visit Primary care visit Timing: 28 days Primary outcome: Workload - total number of primary care	Objective: Unclear Patient reported: Unclear

Study Country # Enrolled # Arms Relevant KQ (Companion Papers)	Key Components (Staff, Mode, Protocol, Hours)	Eligibility	Mean Age (SD) % Female % Race Top 3 Health Issues Insurance Type	Reported Outcomes Timing Primary Outcome	Risk of Bias for Objective and Patient-Reported Outcomes
Anonymous, 2014 ⁹⁹ Mayor, 2014 ¹⁰⁰)			Black: <1% Hispanic: NA Asian: 1.57% Other: <1% Top 3: NR Insurance type: National Health Service	contracts taking place in 28 days after index appointment request	
Cragg, 1997 ⁴⁴ UK N=2152 patients 2 arms KQs 1, 2, 3 (McKinley, 1997 ¹⁰¹)	MD Telephone Protocol NR After hours	Patients at 1 of 14 practices in Manchester, Salford, Stockport, or Leicester who were resident in that practice for more than 2 weeks and placed an out-of-hours phone call to the practice during the study period	Age: NR Female: NR Race: NR Top 3: NR Insurance type: National Health Service	Outcomes: - Call resolution On-call resolution Primary care visit ED visit - Patient satisfaction - Utilization: Primary care visit Timing: 24-120 hours after call Primary outcome: NR	Overall-objective: High Overall-patient reported: High
Lattimer, 1998 ⁴³ UK N=14492 calls 2 arms KQs 1, 2, 3 (Lattimer, 2000 ¹⁰² Anonymous, 2000 ¹⁰³)	NP, unspecified/admin, receptionist Telephone Protocol: telephone advice system After hours	Patients registered with any of the 19 GP practices in South Wiltshire	Age: NR Female: 52% Race: NR Top 3: NR Insurance type: National Health Service	Outcomes: - Call resolution On-call resolution Primary care visit ED visit - Utilization ED visit Patient safety Timing: 12 months Primary outcome: Safety and effectiveness of intervention	Overall-objective: Low Overall-patient reported: NA
Richards, 2004 ⁴⁰ England N=4718 patients 2 arms	NP unspecified Telephone Protocol: documented	Patients part of a general practice in York, England making a phone call to	Age: 7 age categories Female: 62.7% Race: NR Top 3:	Outcomes: - Call resolution On-call resolution Primary care visit	Overall-objective: Low Overall-patient reported: NA

Study Country # Enrolled # Arms Relevant KQ (Companion Papers)	Key Components (Staff, Mode, Protocol, Hours)	Eligibility	Mean Age (SD) % Female % Race Top 3 Health Issues Insurance Type	Reported Outcomes Timing Primary Outcome	Risk of Bias for Objective and Patient-Reported Outcomes
KQs 1, 2, 3	Regular hours	that practice for a same-day appointment	- Respiratory system: 38.5% - Digestive system: 14.5% - Musculoskeletal: 13.9% Insurance type: National Health Service	-Utilization: ED visit Primary care visit - Total cost Timing: Index consultations; follow-up care 1 month after index Primary outcome: Type of consultation after "final point of contact"	
<i>Controlled before-after</i>					
Knowles, 2016 ³⁷ England N=2237 patients 4 arms KQs 1, 3 (Southard, 2014 ¹⁰⁴ O'Cathain, 2014 ¹⁰⁵)	Nonclinical call handlers Telephone NHS Pathways software Regular and after hours	Partitioned by locations served by NHS trusts; English language; age ≥16 for respondent but user of service could be a child; other: recent user of urgent care	Age: 5 age categories <u>NHS 111 before arm</u> Female: 45.9% White: 86.2% Black: NA Hispanic: NA Asian: NA Other: 13.7% <u>NHS 111 after arm</u> Female: 51.2% White: 86.7% Black: NA Hispanic: NA Asian: NA Other: 13.3% Top 3: NR Insurance type: National Health Service	Outcomes: - Patient satisfaction Timing: 9 or 12 months Primary outcome: Change in satisfaction with telephone triage 9 months (or 12 months) after the launch of NHS 111	Overall-objective: NA Overall-patient reported: High
Munro, 2000 ⁴⁵ UK N=68,500 calls	NP Telephone	Population receiving health care in Preston and Corley, Milton Keynes,	Age: NR Female: NR Race: NR	Outcomes: - Utilization ED visit	Overall-objective: High

Study Country # Enrolled # Arms Relevant KQ (Companion Papers)	Key Components (Staff, Mode, Protocol, Hours)	Eligibility	Mean Age (SD) % Female % Race Top 3 Health Issues Insurance Type	Reported Outcomes Timing Primary Outcome	Risk of Bias for Objective and Patient-Reported Outcomes
1 arm KQs 1, 3	Protocol: NHS Clinical Assessment System Regular and after hours	and Northumbria regions in the United Kingdom	Top 3: NR Insurance type: NR	Primary care visit Timing: 24 months Primary outcome: Changes in trends in use of health care system after introduction of nurse-led triage	Overall-patient reported: NA
Turner, 2013 ³⁹ England N=1,802,000 calls 2 arms KQs 1, 2, 3 (Southard, 2014 ¹⁰⁴ O'Cathain, 2014 ¹⁰⁵)	NP, unspecified/admin receptionist Telephone Protocol: NHS Pathways Assessment System Regular and after hours	Community user in different geographic areas placing a triage telephone call; no N reported for control arm (NHS Direct); different cities/regions compared	Age: NR Female: NR Race: NR Top 3: NR Insurance type: National Health Service	Outcomes: Utilization ED visit Primary care visit Timing: 12 months Primary outcome: Changes in use of emergency and urgent care services	Overall-objective: Unclear Overall-patient reported: NA
<i>Interrupted time series</i>					
Richards, 2002 ⁴¹ UK N=4685 patients 2 arms KQs 1, 2, 3 (Richards, 2004 ¹⁰⁶)	RN Telephone Protocol: Internally developed Regular hours	Consecutive patients in 1 of 3 practices around York, England, who called requesting a same-day appointment; member of general practice group	Age: 0 to ≥75 Female: 61.3% Race: NR Top 3: - Respiratory, 37.8% - Dermatological, 15.2% - Musculoskeletal, 13.3% Insurance type: National Health Service	Outcomes: -Call resolution On call resolution Primary care visit Utilization: ED visit Primary care visit - Total cost Timing: Time of call through 1 month thereafter Primary outcome: NR	Overall ROB rating for interrupted time series: Low

Abbreviations: CDSS=clinical decision support software/system; CeCC=CareEnhance Call Centre software; ED=emergency department; GP=general practitioner; MD=medical doctor; NA=not applicable; NHS=National Health Service; NP=nurse practitioner; NR=not reported; PEE=planning, execution, evaluation (phases); PPT=people, process, technology (aspects); ROB=risk of bias; SD=standard deviation

KQ 2 STUDIES

Study Country # Enrolled Study Design (Companion)	Key Components (Staff, Mode, Protocol, Hours)	Eligibility	Mean Age (SD) % Adult % Female % Race Top 3 Health Issues Insurance Type	Outcome Description Level (PEE) Aspect (PPT)	Risk of Bias
<i>Qualitative studies</i>					
Banks, 2018 ⁸¹ UK 23 Qualitative	MDs, NPs, Admins, Practice Managers Internet-based eConsult Hours NR	Practice staff including reception and administrative staff, practice managers, and GPs from 6 practices in the west of England.	Age: NR Adult: NR Female: NR Race: NR Top 3: NR Insurance type: NR	Evaluation: Process Evaluation: People	Appropriate approach? Yes Adequate data collection? Yes Findings derived from data? Yes Results substantiated by data? Yes Coherence between data and interpretation? Yes
Derkx, 2007 ⁸⁰ Netherlands 8 Qualitative	Focus group members (patients, call handlers, GPs, management) Telephone Protocol NR After hours	Patients were members of patient groups; call handlers worked at after-hours call centers as supervisors or call handlers; GPs worked at after-hours centers and were involved in ensuring quality of care; and members of the management team were involved with general issues of management at after- hours centers.	Age: NR Adult: 100% Female: NR Race: NR Top 3: NR Insurance type: NR	Evaluation: People	Appropriate approach? Yes Adequate data collection? Can't tell Findings derived from data? Yes Results substantiated by data? Yes Coherence between data and interpretation? Yes

Study Country # Enrolled Study Design (Companion)	Key Components (Staff, Mode, Protocol, Hours)	Eligibility	Mean Age (SD) % Adult % Female % Race Top 3 Health Issues Insurance Type	Outcome Description Level (PEE) Aspect (PPT)	Risk of Bias
Eccles, 2015 ⁶² UK 55 Qualitative	MD, call handlers Telephone Internally developed protocol After hours	Patients who called Cardiff and Vale after- hours service both before and after an “expert triage” service was implemented in April 2013. GP triage practitioners who practiced under either the “previous” or “expert triage” models or both.	Age: NR Adult: 100% Female: NR Race: NR Top 3: NR Insurance type: National Health Service	Planning: People Planning: Process	Appropriate approach? Yes Adequate data collection? Yes Findings derived from data? Yes Results substantiated by data? Yes Coherence between data and interpretation? Yes
Edwards, 1998 ⁶⁷ UK 8 Qualitative	Nurse Telephone Simulated calls for triage Hours NR	Qualified nurses working in community hospitals with walk-in minor injury service that also handled phone inquiries.	Age: 23-50 Adult: 100% Female: NR Race: NR Top 3: NR Insurance type: NR	Planning: Process Execution: Process	Appropriate approach? Yes Adequate data collection? Yes Findings derived from data? Yes Results substantiated by data? Yes Coherence between data and interpretation? Yes
Foster, 1999 ⁶³ UK 38 Qualitative	MD Telephone Protocol NR After hours	GPs recruited from one health authority in south London.	Mean Age: 42 Adult: 100% Female: 71% Race: NR Top 3: NR Insurance type: NR	Planning: People Planning: Process	Appropriate approach? Yes Adequate data collection? Yes Findings derived from data? Yes Results substantiated by data? Yes Coherence between data and interpretation? Yes
Gamst-Jensen, 2017 ⁶⁸ Denmark 19 Mixed methods	Nurse, MD Telephone Internally developed protocol After hours	Patients who called the after-hours hotline in Copenhagen.	Age: <1 to 79 Adult: 84% Female: 58% Race: NR Top 3: abdominal pain Insurance type: NR	Execution: Process	Appropriate approach? Yes Adequate data collection? Yes Findings derived from data? Yes Results substantiated by data? Yes Coherence between data and interpretation? Yes

Study Country # Enrolled Study Design (Companion)	Key Components (Staff, Mode, Protocol, Hours)	Eligibility	Mean Age (SD) % Adult % Female % Race Top 3 Health Issues Insurance Type	Outcome Description Level (PEE) Aspect (PPT)	Risk of Bias
Greatbatch, 2005 ⁸² UK 60 Qualitative	Nurse, call handlers Telephone NHS Direct computerized clinical assessment system (CAS) Regular hours and after hours	60 calls were selected from one site within NHS. No specific criteria identified.	Age: NR Adult: NR Female: NR Race: NR Top 3: NR Insurance type: NR	Planning: Technology Evaluation: Technology	Appropriate approach? Yes Adequate data collection? Yes Findings derived from data? Yes Results substantiated by data? Yes Coherence between data and interpretation? Yes
Holmström, 2007 ⁷⁶ Sweden 12 Qualitative (Ernesater, 2009 ¹⁰⁷)	Nurse Telephone Protocol NR Regular hours	Nurses were recruited from 1 call center in mid-Sweden between 2004-2005.	Age: 35-63 Adult: 100% Female: 0% Race: NR Top 3: NR Insurance type: NR	Planning: People Planning: Process	Appropriate approach? Yes Adequate data collection? Yes Findings derived from data? Yes Results substantiated by data? Yes Coherence between data and interpretation? Yes
Holmström, 2016 ⁷⁵ Sweden 10 Qualitative	Nurse Telephone Protocol NR Regular hours	Inclusion criteria were that the participants were older than 65 and have experience calling telephone advise nursing services seeking advice for a health-related problem. Patients were excluded who only called to make an appointment to see a clinician.	Age: 68-95 Adult: 100% Female: 60% Race: NR Top 3: NR Insurance type: NR	Planning: Process	Appropriate approach? Yes Adequate data collection? Yes Findings derived from data? Yes Results substantiated by data? Yes Coherence between data and interpretation? Yes
Lopriore, 2017 ⁸³ Australia 196 Qualitative	RN Telephone Computer decision support software and HealthCare Direct policy	Patients calling in on the triage health care phone line.	Age: NR Adult: 100% Female: 100% Race: NR Top 3: NR	Planning: Process	Appropriate approach? Yes Adequate data collection? Yes Findings derived from data? Yes Results substantiated by data? Yes Coherence between data and interpretation? Yes

Study Country # Enrolled Study Design (Companion)	Key Components (Staff, Mode, Protocol, Hours)	Eligibility	Mean Age (SD) % Adult % Female % Race Top 3 Health Issues Insurance Type	Outcome Description Level (PEE) Aspect (PPT)	Risk of Bias
	Hours NR		Insurance type: National health insurance		
O'Cathain, 2004 ⁷⁹ UK 24 Mixed methods (O'Cathain, 2004 ¹⁰⁸)	RN Telephone 3 different decision support programs used by the interviewed nurses Regular hours, after hours	Triage nurse in one of 12 sites for NHS Direct for the interview (qualitative) portion or in one of 14 sites and who had received more than 10 triage calls for the abstracted (quantitative) portion.	Age: NR Adult: 100% Female: 90% Race: NR Top 3: NR Insurance type: NR	Planning: People Planning: Process	Appropriate approach? Yes Adequate data collection? Yes Findings derived from data? Yes Results substantiated by data? Yes Coherence between data and interpretation? Yes
Pettinari, 2001 ⁶⁹ UK 14 Qualitative	Nurse Telephone NHS CDSS "Clinical Decision Support Software" Regular hours, after-hours	None explicitly stated	Age: NR Adult: NR Female: NR Race: NR Top 3: NR Insurance type: NR	Execution: Process	Appropriate approach? Yes Adequate data collection? Yes Findings derived from data? Yes Results substantiated by data? Yes Coherence between data and interpretation? Yes
Pope, 2013 ⁷² UK 64 Qualitative	Call handlers Telephone Clinical Decision Support (CDS) Regular hours, after hours	Call handlers were purposely sampled. Stakeholders, system developers, corporate/operational managers were also considered. Sampled participants worked in 1 of 3 settings within the NHS: for 999 emergency care, a GP after-hours urgent care service, or a single point of access service.	Age: NR Adult: 100% Female: NR Race: NR Top 3: NR Insurance type: NR	Execution: Technology Evaluation: Technology	Appropriate approach? Yes Adequate data collection? Yes Findings derived from data? Yes Results substantiated by data? Yes Coherence between data and interpretation? Yes

Study Country # Enrolled Study Design (Companion)	Key Components (Staff, Mode, Protocol, Hours)	Eligibility	Mean Age (SD) % Adult % Female % Race Top 3 Health Issues Insurance Type	Outcome Description Level (PEE) Aspect (PPT)	Risk of Bias
Purc- Stephenson, 2010 ⁶⁴ Multiple 16 studies Meta- ethnography	Nurse Telephone Protocol NR Hours NR	Studies meeting following criteria: include an evaluation of telephone triage and advice; use qualitative methodology; include nurses in the sample; provide primary-care services. Excluded reviews or discussion papers, and studies in which telephone service was for specialized services, chronic conditions, or mental health.	Age: NR Adult: NR Female: NR Race: NR Top 3: NR Insurance type: NR	Planning: People Planning: Process Execution: Process	Overall ROB rating: Good
Richards, 2007 ⁷⁴ UK 27 Qualitative	MD, nurse, unspecified, admin, paramedic Telephone Protocol used (no information) After-hours	Users of after-hours primary care services in 3 regions in England over a 2-week period, with sampling strategy to include heterogeneity in terms of affluence, deprivation, and ethnic diversity, and equal numbers of service users from each area, parents of children aged 11 or younger and people in the age groups 17-49 and 50 plus, and individuals receiving different management options (telephone advice,	Age: 55.4 Adult: 74% Female: 48 Race: White: 96% Black: 4% Top 3: NR Insurance type: NR	Planning: Process	Appropriate approach? Yes Adequate data collection? Yes Findings derived from data? Yes Results substantiated by data? Yes Coherence between data and interpretation? Yes

Study Country # Enrolled Study Design (Companion)	Key Components (Staff, Mode, Protocol, Hours)	Eligibility	Mean Age (SD) % Adult % Female % Race Top 3 Health Issues Insurance Type	Outcome Description Level (PEE) Aspect (PPT)	Risk of Bias
		treatment center, or home visit). Exclusions: ages 12-16; person too unwell to participate in focus group/interview (eg, end-stage terminal illness, recent hospital admission, nursing home resident); contact details omitted; person flagged on system as aggressive or violent or and requiring special procedures.			
Roberts, 2009 ⁷⁷ UK 35 Qualitative	Nurse Telephone Protocol NR Regular hours, after hours	Stakeholders=senior level individuals working on the design and implementation of NHS24 Partners=individuals with responsibility for the delivery of care within one of the partner organizations.	Age: NR Adult: NR Female: NR Race: NR Top 3: NR Insurance type: NR	Planning: Process Execution: Process	Appropriate approach? Yes Adequate data collection? Yes Findings derived from data? Yes Results substantiated by data? Yes Coherence between data and interpretation? Yes

Study Country # Enrolled Study Design (Companion)	Key Components (Staff, Mode, Protocol, Hours)	Eligibility	Mean Age (SD) % Adult % Female % Race Top 3 Health Issues Insurance Type	Outcome Description Level (PEE) Aspect (PPT)	Risk of Bias
Röing, 2015 ⁶⁵ Sweden 11 Qualitative	RN, Call Managers Telephone Decision Support Tool (DST) Regular hours, after hours	Telenurses involved in one of 33 malpractice claims filed between 2003-2010 or managers of one of the 23 call centers throughout Sweden for the national healthcare hotline.		Planning: Process Evaluation: Process	Appropriate approach? Yes Adequate data collection? Yes Findings derived from data? Yes Results substantiated by data? Yes Coherence between data and interpretation? Yes
Tariq, 2017 ⁷³ Australia 9 Mixed methods	Nurse Telephone CeCC Regular hours, after hours	The national remote triage system, Healthdirect Australia, assisted in the identification of the nine nurses interviewed about the usability of the CeCC decision support system.	Age: NR Adult: NR Female: NR Race: NR Top 3: NR Insurance type: NR	Planning: Technology	Appropriate approach? Yes Adequate data collection? Can't tell Findings derived from data? Can't tell Results substantiated by data? Yes Coherence between data and interpretation? Can't tell
Timpka, 1990 ⁷⁰ Sweden 5 Qualitative	Nurse Telephone Protocol NR Hours NR	Eligible nurses were those who were receptionist nurses at the only HC in town. No other eligibility criteria were provided.	Age: 37 Adult: 100% Female: NR Race: NR Top 3: NR Insurance type: NR	Execution: Process	Appropriate approach? Yes Adequate data collection? Yes Findings derived from data? Yes Results substantiated by data? Yes Coherence between data and interpretation? Yes

Study Country # Enrolled Study Design (Companion)	Key Components (Staff, Mode, Protocol, Hours)	Eligibility	Mean Age (SD) % Adult % Female % Race Top 3 Health Issues Insurance Type	Outcome Description Level (PEE) Aspect (PPT)	Risk of Bias
Turnbull, 2012 ⁷⁸ UK 61 Mixed methods	NR Telephone CDSS Hours NR	Method 1 Interviews: purposive sample of call-handlers and "stakeholders." Method 2 Observation: 491 hours. Method 3 Survey: all call-handlers.	Age: NR Adult: NR Female: NR Race: NR Top 3: NR Insurance type: NR	Planning: People	Appropriate approach? Yes Adequate data collection? Yes Findings derived from data? Yes Results substantiated by data? Yes Coherence between data and interpretation? Yes
Turnbull, 2017 ⁷¹ UK 47 Organizational case study (Turnbull, 2014 ¹⁰⁹)	MD, RN, call advisers, unspecified/admin Telephone NHS Pathways Regular hours, after hours	Employee at one of 5 NHS sites performing 111 services during 2011-12.	Age: NR Adult: 100% Female: NR Race: NR Top 3: NR Insurance type: NR	Planning: People Execution: Process Planning: Technology	Appropriate approach? Yes Adequate data collection? Yes Findings derived from data? Yes Results substantiated by data? Yes Coherence between data and interpretation? Yes
Wahlburg, 2018 ⁶¹ Sweden 24 Qualitative (Bjorkman, 2017 ¹¹⁰)	Nurse Telephone CDSS Hours NR	Worked in 1 of 6 chosen current call center for at least 6 months at the time of the interview.	Age: 55 (1.7) Adult: 100% Female: 100% Race: NR Top 3: NR Insurance type: NR	Planning: People Planning: Process Planning: Technology	Appropriate approach? Yes Adequate data collection? Yes Findings derived from data? Can't tell Results substantiated by data? Yes Coherence between data and interpretation? Can't tell

Study Country # Enrolled Study Design (Companion)	Key Components (Staff, Mode, Protocol, Hours)	Eligibility	Mean Age (SD) % Adult % Female % Race Top 3 Health Issues Insurance Type	Outcome Description Level (PEE) Aspect (PPT)	Risk of Bias
Systematic reviews					
Blank, 2012 ⁶⁶ Multiple 54 papers	MD, Nurse, Lay operator Telephone Protocol NR Regular hours, after hours	This systematic review included studies about telephone triage. Twenty-six studies reported appropriateness of triage decisions and 26 papers reported on compliance with triage decision. Two studies reported both.	Age: NR Adult: NR Female: NR Race: NR Top 3: NR Insurance type: NR	Execution: People Evaluation: People Execution: Process Evaluation: Process	Overall ROB: Poor
Bunn, 2004 ²¹ NR 9 studies	NR Telephone Protocol NR Hours NR	Systematic review assessed the effects of telephone triage on safety, service usage, and patient satisfaction and compare telephone triage by different health care professionals.	Age: NR Adult: NR Female: NR Race: NR Top 3: NR Insurance type: NR	Evaluation: Process Evaluation: Technology	Overall ROB: Good
Carrasqueiro, 2011 ³⁶ Multiple 55 studies	NR Telephone Protocol NR Hours NR	This systematic review included studies on telephone triage to review evaluation studies and compile methodologies and metrics used as well as compare results.	Age: NR Adult: NR Female: NR Race: NR Top 3: NR Insurance type: NR	Evaluation: Process	Overall ROB: Poor

Study Country # Enrolled Study Design (Companion)	Key Components (Staff, Mode, Protocol, Hours)	Eligibility	Mean Age (SD) % Adult % Female % Race Top 3 Health Issues Insurance Type	Outcome Description Level (PEE) Aspect (PPT)	Risk of Bias
Lake, 2017 ²³ Multiple 10 systematic reviews	MD, Nurse, Admin/receptionist , Health assistant Telephone Protocol varies Regular hours, after hours	Overview of systematic reviews focused on telephone-based triage and advice services; available in English; published since 1990; not targeting specific condition, population, medical specialty, or chronic conditions; and not related to general health education.	Age: NR Adult: NR Female: NR Race: NR Top 3: NR Insurance type: NR	Execution: People Evaluation: Process Execution: Technology	Overall ROB: Fair

Abbreviations: CDSS=clinical decision support software/system; CeCC=CareEnhance Call Centre software; GP=general practitioner; MD=medical doctor; NHS=National Health Service; NP=nurse practitioner; NR=not reported; PEE=planning, execution, evaluation (phases); PPT=people, process, technology (aspects); ROB=risk of bias; SD=standard deviation

APPENDIX D. EXCLUDED STUDIES

KQ 1 EXCLUDED STUDIES

Study	Exclusion reason	Not full publication	Not population of interest	Not eligible setting	Not eligible intervention	Not eligible design	Not eligible outcome
Albahri, 2018 ¹						X	
Andrews, 2014 ²		X					
Anonymous, 1997 ³			X				
Anonymous, 2015 ⁴		X					
Anonymous, 2015 ⁵		X					
Anonymous, 2015 ⁶		X					
Anonymous, 2014 ⁷		X					
Bearden, 2008 ⁸						X	
Bergmo, 2005 ⁹					X		
Biermann, 2002 ¹⁰					X		
Blank, 2012 ¹¹		X					
Campbell, 2015 ¹²		X					
Carrasqueiro, 2011 ¹³						X	
Castro, 2014 ¹⁴					X		
Chmiel, 2011 ¹⁵						X	
Cronin, 2017 ¹⁶			X				
Dale, 2011 ¹⁷		X					
de Coster, 2010 ¹⁸						X	
Downes, 2017 ¹⁹						X	
Dunt, 2006 ²⁰						X	
Dunt, 2007 ²¹						X	
Eccles, 2015 ²²						X	
Eppes, 2012 ²³				X			
Garratt, 2007 ²⁴						X	
Godfrey, 2006 ²⁵		X					
Gulacti, 2017 ²⁶					X		
Gulacti, 2017 ²⁷					X		
Hansen, 1998 ²⁸						X	

Study	Exclusion reason	Not full publication	Not population of interest	Not eligible setting	Not eligible intervention	Not eligible design	Not eligible outcome
Holroyd, 2007 ²⁹					X		
Howard, 2007 ³⁰						X	
Howell, 2016 ³¹			X				
Huber, 2011 ³²					X		
Huibers, 2011 ³³					X		
Huibers, 2012 ³⁴						X	
Jackman, 1998 ³⁵			X				
Jones, 2018 ³⁶					X		
Katz, 2003 ³⁷							X
Kim, 2013 ³⁸					X		
Klasner, 2006 ³⁹			X				
Knight, 2010 ⁴⁰			X				
Krumperman, 2015 ⁴¹						X	
Liedberg, 2016 ⁴²				X			
Lin, 2005 ⁴³					X		
Mallett, 2014 ⁴⁴					X		
Manzo-Silberman, 2015 ⁴⁵					X		
Marsh, 2014 ⁴⁶				X			
Mayor, 2014 ⁴⁷			X				
Melnyk, 2008 ⁴⁸			X				
Morrissey, 1997 ⁴⁹			X				
Murdoch, 2015 ⁵⁰						X	
Nagle, 1992 ⁵¹						X	
Navratil-Strawn, 2014 ⁵²						X	
O'Keeffe, 2008 ⁵³					X		
O'Malley, 2013 ⁵⁴					X		
Ong, 2008 ⁵⁵						X	
Philips, 2010 ⁵⁶					X		
Philips, 2012 ⁵⁷				X			
Purc-Stephenson, 2012 ⁵⁸						X	
Rahmqvist, 2011 ⁵⁹					X		
Richards, 2008 ⁶⁰				X			
Roberts, 2007 ⁶¹		X					

Study	Exclusion reason	Not full publication	Not population of interest	Not eligible setting	Not eligible intervention	Not eligible design	Not eligible outcome
Roberts, 2007 ⁶²		X					
Roth, 2006 ⁶³					X		
Rouse, 2007 ⁶⁴			X				
Salk, 1998 ⁶⁵					X		
Shannon, 2006 ⁶⁶					X		
Shekelle, 1999 ⁶⁷			X				
Smits, 2012 ⁶⁸					X		
Smits, 2017 ⁶⁹			X				
Smitsa, 2016 ⁷⁰			X				
Somers, 1994 ⁷¹			X				
Soulleihat, 2014 ⁷²					X		
Spaulding, 2012 ⁷³					X		
Stacey, 2014 ⁷⁴					X		
Stuart, 2000 ⁷⁵						X	
Takala, 1997 ⁷⁶					X		
Thompson, 1999 ⁷⁷			X				
Turner, 2009 ⁷⁸					X		
Valsangkar, 2017 ⁷⁹				X			
van Ierland, 2011 ⁸⁰					X		
Van Uden, 2005 ⁸¹						X	
Villarreal, 2017 ⁸²						X	
Westra, 2015 ⁸³					X		
Willekens, 2011 ⁸⁴						X	

References to Appendix D: KQ 1 Excluded Studies

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KQ 2 EXCLUDED STUDIES

Exclusion reason Study	Not full publication	Not eligible country	Not population of interest	Not eligible setting	Not eligible intervention	Not eligible design	Not eligible outcome
Allan, 2014 ¹							X
Allen, 2008 ²	X						
Allen, 2008 ³				X			
Anderson, 2015 ⁴							X
Andreae, 2015 ⁵		X					
Anonymous, 1997 ⁶						X	
Anonymous, 1997 ⁷					X		
Anonymous, 1998 ⁸			X				
Anonymous, 2001 ⁹	X						
Anonymous, 2003 ¹⁰	X						
Anonymous, 2005 ¹¹							X
Anonymous, 2006 ¹²	X						
Anonymous, 2014 ¹³						X	
Anonymous, 2015 ¹⁴	X						
Anonymous, 2015 ¹⁵							X
Aranda, 2001 ¹⁶				X			
Arioto, 2000 ¹⁷	X						
Arioto, 2000 ¹⁸	X						
Atherton, 2018 ¹⁹					X		
Atherton, 2018 ²⁰					X		
Bagayoko, 2014 ²¹		X					
Barrett, 2017 ²²					X		
Baylis, 2012 ²³						X	
Bjorkman, 2018 ²⁴			X				
Blanchfield, 1997 ²⁵						X	
Blinkenberg, 2013 ²⁶	X						
Boidron, 2016 ²⁷							X
Bolton, 2002 ²⁸						X	
Boxer, 2008 ²⁹	X						
Brant, 2018 ³⁰					X		

Exclusion reason Study	Not full publication	Not eligible country	Not population of interest	Not eligible setting	Not eligible intervention	Not eligible design	Not eligible outcome
Brennan, 1992 ³¹						X	
Britnell, 2005 ³²	X						
Brown, 2012 ³³							X
Brunett, 2015 ³⁴						X	
Buja, 2015 ³⁵							X
Bunn, 2005 ³⁶							X
Buppert, 2009 ³⁷	X						
Busk Nørøxe, 2017 ³⁸							X
Busk Nørøxe, 2017 ³⁹						X	
Cady, 1999 ⁴⁰	X						
Cady, 1999 ⁴¹	X						
Car, 2003 ⁴²					X		
Car, 2004 ⁴³						X	
Caralis, 2010 ⁴⁴							X
Castellote, 2016 ⁴⁵	X						
Chang, 2001 ⁴⁶						X	
Charles-Jones, 2003 ⁴⁷							X
Chow, 2008 ⁴⁸		X					
Christensen, 1998 ⁴⁹							X
Clawson, 2001 ⁵⁰				X			
Clay-Williams, 2017 ⁵¹					X		
Coleman, 1997 ⁵²	X						
Comino, 2007 ⁵³					X		
Connechen, 2006 ⁵⁴						X	
Cook, 2015 ⁵⁵							X
Coombes, 2016 ⁵⁶	X						
Cosford, 2010 ⁵⁷	X						
Cragg, 1994 ⁵⁸							X
Craig, 2015 ⁵⁹							X
Crouch, 1999 ⁶⁰							X
Cunningham, 2012 ⁶¹					X		
Custer, 2003 ⁶²						X	

Exclusion reason Study	Not full publication	Not eligible country	Not population of interest	Not eligible setting	Not eligible intervention	Not eligible design	Not eligible outcome
Dahlgren, 2017 ⁶³					X		
Dale, 1998 ⁶⁴						X	
Dale, 2011 ⁶⁵							X
de Almeida Barbosa, 2016 ⁶⁶						X	
Demiris, 2004 ⁶⁷					X		
Derkx, 2009 ⁶⁸						X	
Derkx, 2008 ⁶⁹						X	
DeVore, 1999 ⁷⁰						X	
Doughty, 2008 ⁷¹						X	
Downes, 2017 ⁷²					X		
Drennan, 2015 ⁷³	X						
Dundas, 1998 ⁷⁴	X						
Dunt, 2006 ⁷⁵						X	
Dunt, 2005 ⁷⁶						X	
Eastwood, 2018 ⁷⁷							X
Eastwood, 2017 ⁷⁸							X
Edmonds, 1997 ⁷⁹							X
Edwards, 2017 ⁸⁰						X	
Ek, 2015 ⁸¹			X				
Elnicki, 2000 ⁸²					X		
Eminovic, 2004 ⁸³						X	
Erdman, 2001 ⁸⁴					X		
Ernesäter, 2010 ⁸⁵						X	
Fletcher, 1999 ⁸⁶					X		
Flynn, 1998 ⁸⁷							X
Foels, 2004 ⁸⁸						X	
Fortune, 2001 ⁸⁹							X
Gaffney, 2001 ⁹⁰			X				
Gallagher, 1998 ⁹¹	X						
Gardner, 2010 ⁹²						X	
George, 1995 ⁹³						X	

Exclusion reason Study	Not full publication	Not eligible country	Not population of interest	Not eligible setting	Not eligible intervention	Not eligible design	Not eligible outcome
George, 1995 ⁹⁴						X	
Gerard, 2006 ⁹⁵							X
Giesen, 2007 ⁹⁶							X
Giesen, 2007 ⁹⁷						X	
Gill, 1999 ⁹⁸	X						
Gillen, 2010 ⁹⁹						X	
Gobis, 1997 ¹⁰⁰	X						
Godden, 2011 ¹⁰¹						X	
Godfrey, 2006 ¹⁰²							X
Gonzalez, 2015 ¹⁰³					X		
Goode, 2004 ¹⁰⁴					X		
Goransson, 2003 ¹⁰⁵					X		
Göransson, 2005 ¹⁰⁶						X	
Graber, 2003 ¹⁰⁷	X						
Grady, 2007 ¹⁰⁸					X		
Grenier, 2000 ¹⁰⁹						X	
Griffin, 2017 ¹¹⁰						X	
Gustafsson, 2016 ¹¹¹	X						
Hagan, 2000 ¹¹²	X						
Healy, 2000 ¹¹³					X		
Heath, 2007 ¹¹⁴						X	
Hildebrandt, 2006 ¹¹⁵						X	
Hildebrandt, 2003 ¹¹⁶							X
Hoare, 1999 ¹¹⁷							X
Hogenbirk, 2005 ¹¹⁸					X		
Holmstrom, 2002 ¹¹⁹						X	
Holt, 2016 ¹²⁰	X						
Huibers, 2012 ¹²¹					X		
Jackman, 1998 ¹²²							X
Jang-Jaccard, 2014 ¹²³							X
Jayaraman, 2008 ¹²⁴					X		
Jiwa, 2002 ¹²⁵						X	

Exclusion reason Study	Not full publication	Not eligible country	Not population of interest	Not eligible setting	Not eligible intervention	Not eligible design	Not eligible outcome
Johansson, 2014 ¹²⁶						X	
Johnson, 2015 ¹²⁷						X	
Johnson, 2015 ¹²⁸					X		
Johnson, 1995 ¹²⁹					X		
Jones, 2017 ¹³⁰							X
Jones, 2003 ¹³¹							X
Jones, 1998 ¹³²						X	
Jones, 2012 ¹³³					X		
Jung, 2015 ¹³⁴							X
Kaakinen, 2016 ¹³⁵			X				
Kaakinen, 2016 ¹³⁶						X	
Kaminsky, 2017 ¹³⁷						X	
Katz, 2003 ¹³⁸	X						
Khan, 2013 ¹³⁹	X						
Kiddy, 2005 ¹⁴⁰					X		
Kishner, 1997 ¹⁴¹						X	
Knight, 2015 ¹⁴²					X		
Knowles, 2014 ¹⁴³						X	
Koivunen, 2018 ¹⁴⁴						X	
Kwon, 2007 ¹⁴⁵						X	
Labarere, 2003 ¹⁴⁶						X	
Lake, 2016 ¹⁴⁷	X						
Langabeer, 2017 ¹⁴⁸					X		
Larson-Dahn, 2001 ¹⁴⁹						X	
Lattimer, 2005 ¹⁵⁰					X		
Lattimer, 2000 ¹⁵¹					X		
Leclerc, 2003 ¹⁵²					X		
Leibowitz, 2003 ¹⁵³						X	
Leng, 2016 ¹⁵⁴						X	
Leshem-Rubinow, 2015 ¹⁵⁵					X		
Leutgeb, 2014 ¹⁵⁶							X

Exclusion reason							
Study	Not full publication	Not eligible country	Not population of interest	Not eligible setting	Not eligible intervention	Not eligible design	Not eligible outcome
Liederman, 2005 ¹⁵⁷						X	
Lin, 2005 ¹⁵⁸					X		
Ling, 2016 ¹⁵⁹						X	
Loane, 2002 ¹⁶⁰					X		
Locatis, 2010 ¹⁶¹	X						
Lowes, 1997 ¹⁶²					X		
Madlon-Kay, 1991 ¹⁶³						X	
Manuel, 1993 ¹⁶⁴						X	
Marklund, 2007 ¹⁶⁵						X	
Marklund, 1991 ¹⁶⁶					X		
Marklund, 1990 ¹⁶⁷			X				
Martin, 1995 ¹⁶⁸	X						
Martinsson, 2018 ¹⁶⁹	X						
Marvicsin, 2015 ¹⁷⁰	X						
Maynard, 2004 ¹⁷¹					X		
Mayor, 2014 ¹⁷²		X					
McCarthy, 1995 ¹⁷³							X
McKenzie, 2016 ¹⁷⁴	X						
McKenzie, 2016 ¹⁷⁵	X						
McKenzie, 2016 ¹⁷⁶	X						
McKenzie, 2016 ¹⁷⁷					X		
McKinstry, 2002 ¹⁷⁸							X
McNeil, 2007 ¹⁷⁹					X		
McNicholas, 2018 ¹⁸⁰						X	
Meng, 2015 ¹⁸¹						X	
Midtbo, 2017 ¹⁸²							X
Moffatt, 2011 ¹⁸³	X						
Mohammed, 2012 ¹⁸⁴						X	
Moll van Charante, 2006 ¹⁸⁵							X
Moll van Charante, 2006 ¹⁸⁶					X		

Exclusion reason Study	Not full publication	Not eligible country	Not population of interest	Not eligible setting	Not eligible intervention	Not eligible design	Not eligible outcome
Monsuez, 2009 ¹⁸⁷	X						
Montalto, 2010 ¹⁸⁸							X
Moore, 2002 ¹⁸⁹							X
Moriarty, 2003 ¹⁹⁰					X		
Morimura, 2005 ¹⁹¹						X	
Morrow, 2005 ¹⁹²	X						
Moth, 2014 ¹⁹³			X				
Moth, 2013 ¹⁹⁴	X						
Mounce, 2016 ¹⁹⁵							X
Munro, 2003 ¹⁹⁶						X	
Murphy, 2000 ¹⁹⁷							X
Narasimha, 2017 ¹⁹⁸					X		
Nemes, 2011 ¹⁹⁹	X						
Newbould, 2017 ²⁰⁰	X						
Newton, 2006 ²⁰¹	X						
Niemann, 2004 ²⁰²	X						
Niv, 2018 ²⁰³	X						
North, 2014 ²⁰⁴					X		
O'Cathain, 2014 ²⁰⁵					X		
O'Cathain, 2003 ²⁰⁶					X		
Olesen, 1994 ²⁰⁷						X	
O'Malley, 2012 ²⁰⁸							X
Ong, 2008 ²⁰⁹					X		
Onubogu, 2013 ²¹⁰							X
Owens, 2017 ²¹¹							X
Palma, 2014 ²¹²						X	
Pancer, 2018 ²¹³	X						
Philips, 2015 ²¹⁴							X
Poole, 2011 ²¹⁵						X	
Pooley, 2003 ²¹⁶					X		
Pope, 2017 ²¹⁷					X		
Posocco, 2018 ²¹⁸						X	

Exclusion reason Study	Not full publication	Not eligible country	Not population of interest	Not eligible setting	Not eligible intervention	Not eligible design	Not eligible outcome
Proctor, 2002 ²¹⁹						X	
Quallich, 2003 ²²⁰						X	
Reisinger, 1998 ²²¹			X				
Richards, 2000 ²²²							X
Ritter, 2010 ²²³							X
Roberts, 1998 ²²⁴	X						
Roberts, 2007 ²²⁵						X	
Roberts, 2007 ²²⁶						X	
Robinson, 1996 ²²⁷						X	
Rodway, 2013 ²²⁸						X	
Roing, 2015 ²²⁹					X		
Rortveit, 2013 ²³⁰						X	
Rosenblatt, 2001 ²³¹							X
Rutenberg, 2000 ²³²							X
Rutenberg, 2000 ²³³		X					
Rutenberg, 2008 ²³⁴					X		
Sagrillo, 2002 ²³⁵					X		
Sakurai, 2014 ²³⁶							X
Salisbury, 2005 ²³⁷	X						
Salisbury, 2000 ²³⁸						X	
Salisbury, 1997 ²³⁹						X	
Salk, 1998 ²⁴⁰					X		
Salman, 2014 ²⁴¹		X					
Sanderson, 2008 ²⁴²			X				
Sands, 2013 ²⁴³						X	
Sandvik, 2018 ²⁴⁴						X	
Sapient, 2000 ²⁴⁵				X			
Schlachta-Fairchild, 2010 ²⁴⁶						X	
Schoenfeld, 2016 ²⁴⁷					X		
Scott-Jones, 2008 ²⁴⁸						X	
Shani, 2015 ²⁴⁹						X	

Exclusion reason Study	Not full publication	Not eligible country	Not population of interest	Not eligible setting	Not eligible intervention	Not eligible design	Not eligible outcome
Shekelle, 1999 ²⁵⁰							X
Simonsen-Anderson, 2002 ²⁵¹						X	
Simpson, 2000 ²⁵²					X		
Singh, 2013 ²⁵³	X						
Skorin-Kapov, 2010 ²⁵⁴						X	
Smith, 2001 ²⁵⁵				X			
Smits, 2017 ²⁵⁶			X				
Smits, 2017 ²⁵⁷					X		
Smits, 2016 ²⁵⁸					X		
Smitsa, 2016 ²⁵⁹						X	
Snooks, 2009 ²⁶⁰	X						
Spence, 2012 ²⁶¹	X						
Sprivulis, 2004 ²⁶²					X		
Srámek, 1994 ²⁶³							X
Stern, 2017 ²⁶⁴	X						
Storhaug, 2017 ²⁶⁵						X	
Stowe, 2010 ²⁶⁶						X	
Ström, 2011 ²⁶⁷					X		
Swage, 2013 ²⁶⁸					X		
Thompson, 1999 ²⁶⁹	X						
Tran, 2017 ²⁷⁰							X
Tranberg, 2018 ²⁷¹						X	
Tuckson, 2017 ²⁷²						X	
Tuden, 2017 ²⁷³					X		
Turner, 2002 ²⁷⁴					X		
van der Biezen, 2017 ²⁷⁵							X
Van Der Biezen, 2016 ²⁷⁶	X						
van Galen, 2018 ²⁷⁷						X	
van Ierland, 2011 ²⁷⁸	X						
van Uden, 2006 ²⁷⁹					X		

Exclusion reason Study	Not full publication	Not eligible country	Not population of interest	Not eligible setting	Not eligible intervention	Not eligible design	Not eligible outcome
Verzantvoort, 2018 ²⁸⁰	X						
Vitacca, 2009 ²⁸¹					X		
Wallace, 2002 ²⁸²				X			
Warren, 2015 ²⁸³							X
Wheeler, 2015 ²⁸⁴						X	
Wheeler, 2000 ²⁸⁵	X						
Willson, 2003 ²⁸⁶	X						
Wootton, 2001 ²⁸⁷					X		
Wouters, 2016 ²⁸⁸	X						
Youssef, 2000 ²⁸⁹					X		
Zummo, 2015 ²⁹⁰				X			

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APPENDIX E. PEER REVIEW COMMENTS AND RESPONSE TABLE

Question Text	Reviewer Number	Comment	Response
Are the objectives, scope, and methods for this review clearly described?	1	Yes	Acknowledged
	3	Yes	Acknowledged
Is there any indication of bias in our synthesis of the evidence?	1	No	Acknowledged
	3	No	Acknowledged
Are there any <u>published</u> or <u>unpublished</u> studies that we may have overlooked?	1	No	Acknowledged
	3	No	Acknowledged
Additional suggestions or comments can be provided below. If applicable, please indicate the page and line numbers from the draft report.	1	Executive Summary should be heavily revised as program partners are unlikely to have time to read the detailed report (which is well written, well organized, insightful, and solid). The Executive Summary has many typos (words that need to be pluralized, missing words, etc.) and does a somewhat poor job of melting down the main report's solid introduction to the point where I was puzzled by the points being made. (e.g., limited provider time, transportation and financial burden are NOT the only other barriers to receiving timely primary care).	Thank you, we have addressed the typos and refined the background information pulled from our main report introduction into the Executive Summary.
		The purpose of triage systems is not clearly enough made in the executive summary either, though in the main report it is well explicated and logical. Technology-based systems are not explained and high-demand for services is not the crux (paragraph 1).	We have expanded on the context for this project in the Executive Summary introduction.
		The executive summary is also not anchored in VA relevance other than a program office partner request -- instead, this report is extremely important to the next steps of the Office of Connected Care, which itself is linked to MISSION Act and EHRM initiatives.	We have added a description of the VA-specific policy context in the executive summary.

Question Text	Reviewer Number	Comment	Response
		The key takeaway points in the summary are lost in the mix of narrative and should be brought forward to make it easier for partners to understand. For example, page 4 top lines: "Evidence suggested that local, practice-based phone triage services have higher case resolution outcomes and refer fewer patients to emergency or primary care services compared with regional/national telephone-based remote triage." This is HUGE!	Thank you, we have created bullet points to highlight the key points in the Executive Summary.
		Same thing with moderate quality of evidence for not managing to decrease ED use (double negatives in sentences around lines 23-26 needs help -- I had to read them a couple of times to understand what was being said).	Thank you for this comment. We have addressed this sentence structure in the final draft.
		And there is no context for the statement -- OCC is hoping/assuming/trusting that the VA telephone triage work is going to reduce PC and ED visit rates. It is implied but never stated clearly. If there's not a lot of evidence this is the case, that's again HUGE.	Thank you. We have added more context and clarity to this finding in the final report.
		I don't understand the last sentence on page 4 lines 26-27 either and does not seem to be of the same value as the other findings included in the executive summary.	We have addressed the wording of this statement in the final report in order to highlight that there is limited high-quality evidence that reported on these prioritized outcomes (n=3).
		In the certainty of evidence table, which is very helpful, there is a missing "to" in line 38 (0.34 fewer to 2.5 more). And there is no information to anchor readers on what ROB means, so recommend the table include not just an explanation of ROB = risk of bias but at least a broad-stroke notion of what fits in that so program partners can better understand why it is a problem/issue. Remember they may never read the report itself, so the executive summary is perhaps the most important part of this report and has to be able to stand on its own.	Thank you for this comment. We have addressed the typo in the certainty of evidence table. We have also added further information about the risk of bias rating to the executive summary under the data abstraction and quality assessment heading.
		Page 5, line 13, we need to know the 11 themes. Operations partners are not going to have time to go through the rest of the report to find them (or at least give them a cross-reference to make it easy or better yet add a table here to go through them like the confidence table).	A table describing the KQ 2 11 themes has been added to the executive summary.

Question Text	Reviewer Number	Comment	Response
		Do not understand the statement on page 5 line 52 around "protocols that undermine nurse clinical judgment."	Thank you, we have significantly revised the summary of KQ 2 and this sentence no longer appears in the Executive Summary.
		Recommendations in the executive summary also need to be bolded or underlined or something to help them come forward (e.g., page 5, lines 43-49) so there is more of a roadmap feel here for adding value to partners trying to extract some key knowledge from the report.	We have added a structure to the KQ 2 section of the Executive Summary to highlight findings.
		Page 6 reference to this as a "meticulous" review was a little off putting -- your operational partners will not know either way, and while it is my sense that the ESP team did an extraordinary job here, this self pat on the back in a summary that did not make it easy to grasp takeaways did not add value.	Thank you for your comment; we have addressed this issue in the final report.
		In the Key Findings section, I really wanted to see more about the hypothesized impacts up front so contextualize what the team found (noted partly above). What does telephone triage aim to accomplish? That needs to be up front so that the frame is set for readers.	We have added more context to the Key Findings section of the discussion to ground our results.
		Under applicability, page 6 line 57, should be findings (not finding) -- there are a lot of places where the grammar needs some help.	Thank you; we have addressed this typo in the final report.
		I suspect given the magnitude of the tasks underlying this report that the executive summary was the last piece added, so I get that, and applaud the ESP team for an exceptional heavy lift on the report that may have contributed to less time on the summary, but I would urge the team to rework the summary, tighten the frame (what triage systems are supposed to accomplish in theory/hope)/rationale for its conduct, tighten the language/writing, and ensure that the main messages are brought forward in a clearer way through formatting or other revisions.	Acknowledged. We have addressed this in the final report.

Question Text	Reviewer Number	Comment	Response
		Under research gaps, line 7 make it delivery (not deliver). Too many of these to list them all here, so needs a word-by-word read/edit up front.	Thank you, we have addressed this and similar issues in the final report.
		In sum, exceptional report, solid writing of the main body of the report, anticipate that this report will have major impacts and contributions to practice and policy improvements, with the proviso that if partners really do only read the executive summary, it needs a major revision to cogently and clearly deliver its main messages/takeaways and to do the rest of the report justice	Acknowledged
	3	Tremendous amount of work went into this. Very disappointing there was not more evidence to evaluate and give policymakers more information about the effectiveness of remote triage but no negative comments about the work. It's a rigorous and comprehensive review of existing literature.	Acknowledged
		Typos Page 1, line 7. Do you “an uneven distribution of providers”	Thank you, this has been fixed in the final report.

APPENDIX F. GLOSSARY

For full study citations in this appendix, please refer to the report's main reference list.

Term	Definition		
After-hours	Hours of operation outside of regular business hours, typically between 5:00pm and 7:00am, weekends, and business holidays; also referred to as out-of-hours.		
Best practices	Processes that are accepted or proven to be most effective in optimizing positive outcomes.		
Case resolution	When a remote triage telephone call is managed on the first contact without triage to other services, or when a caller is connected with the appropriate individual with only 1 call transfer.		
Certainty of evidence (COE)	We assessed COE using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach ¹¹¹ for 4 domains:		
	<i>Domain</i>	<i>Rating</i>	<i>How Assessed</i>
	Risk of bias	Low Unclear High	Assessed primarily through study design and aggregate study quality
	Consistency	Not serious inconsistency Serious inconsistency Very serious inconsistency	Assessed primarily through whether effect sizes are generally on the same side of “no effect,” the overall range of effect sizes, and statistical measures of heterogeneity
	Directness	Not indirect Serious indirectness Very serious indirectness	Assessed by whether the evidence involves direct comparisons or indirect comparisons through use of surrogate outcomes or use of separate bodies of evidence
	Precision	Not serious imprecision Serious imprecision Very serious imprecision	Based primarily on the size of the confidence intervals of effect estimates, the optimal information size and considerations of whether the confidence interval crossed a clinical decision threshold
	Summary COE ratings for a body of evidence: - High—High confidence that the true effect lies close to that of the estimate of the effect. - Moderate—Moderate confidence in the effect estimate. The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different. - Low—Limited confidence in the effect estimate. The true effect may be substantially different from the estimate of the effect.		

Term	Definition
	· Very low—Very little confidence in the effect estimate. The true effect is likely to be substantially different from the estimate of effect. · Insufficient—Impossible or imprudent to rate. In these situations, a rating of insufficient is assigned.
Commercial deputizing service	A service provided by a commercial external agency that has been delegated to cover care for general practitioners.
General practitioner (GP)	A general physician who provides care to a broad population without regard to specific medical specialty. Typically, GPs train and practice in the UK and similar health systems.
Objective outcomes (ie, non-patient-reported outcomes)	Measures that are not subject to a large degree of individual interpretation and are likely to be reliably measured across patients in a study, by different health care providers, and over time.
Patient-reported outcomes	Outcomes that are directly reported by the patient without interpretation of the patient's response by a clinician or anyone else and pertains to the patient's health, quality of life, or functional status associated with health care or treatment.
Risk of bias (ROB)	An assessment of study quality. We used the following guidance in this report. (1) For all KQs, we used the Cochrane EPOC ROB tool, which is applicable to randomized and nonrandomized studies²⁷: · Randomization and allocation concealment · Comparability of groups at baseline · Blinded outcomes assessment · Completeness of follow-up and differential loss to follow-up · Whether incomplete data were addressed appropriately · Protection against contamination · Selective outcomes reporting · Intervention independent from other changes (specific to interrupted time series) · Intervention pre-specified (specific to interrupted time series) · Intervention affect on data collection (specific to interrupted time series) Summary ROB ratings for a study: · Low ROB—Bias, if present, is unlikely to alter the results seriously · Unclear ROB—Bias that raises some doubts about the results · High ROB—Bias that may alter the results seriously (2) For KQ 2, we used the Mixed Methods Appraisal Tool (MMAT) 5-item criteria to evaluate the ROB for qualitative study designs²⁹ · Appropriate qualitative approach · Adequacy of data collection methods · Findings derived from the data · Results supported by the data · Coherence between qualitative data sources, collection, analysis and interpretation No summary ROB was possible for the MMAT.

Term	Definition
	(3) For KQ 2, we used the AMSTAR critical appraisal tool to evaluate eligible systematic review studies³⁰: · <i>A priori</i> design · Specified eligibility criteria · Appropriateness of eligibility restrictions · Comprehensive literature search strategy and search terms · Appropriate search strategy restrictions · Selection bias avoided · Duplicate study selection and data abstraction · Characteristics of included studies reported · Quality of included studies assessed · Conclusions supported by data · Conflict of interest stated Summary ROB ratings for a study: · Good— if present, none of the limitations are thought to decrease the validity of the conclusions · Fair—some uncertainty about the validity of the conclusions · Poor— serious uncertainty about the validity of the conclusions
Standardized mean difference (SMD)	The difference in outcomes between the intervention and comparator, divided by the pooled standard deviation.